Canon Paleo Curriculum
Unit: The Nature of Science
Lesson Plan 3

Activity Name: Scientific Method Today

Observation and Inference

Supplies:
Use the Six Blind Men poem

Preparation:
- Go over definitions of observation and inference with the class before beginning the exercise. Note the background material
- Copy the poem and cut out the six stanzas separately.
- Divide the class into six groups.

Concept:
Students will learn the process of developing observations and inferences from data they collect.

Activity:
- Have each group find the one observation in the stanza.
- From the one stanza each group has, have them develop an inference about the observation. (such as “What types of animals could they be?”)
- Once the group have developed their observations and inference have them join back together as a class.
- Have each group list their observations and inferences on the board.

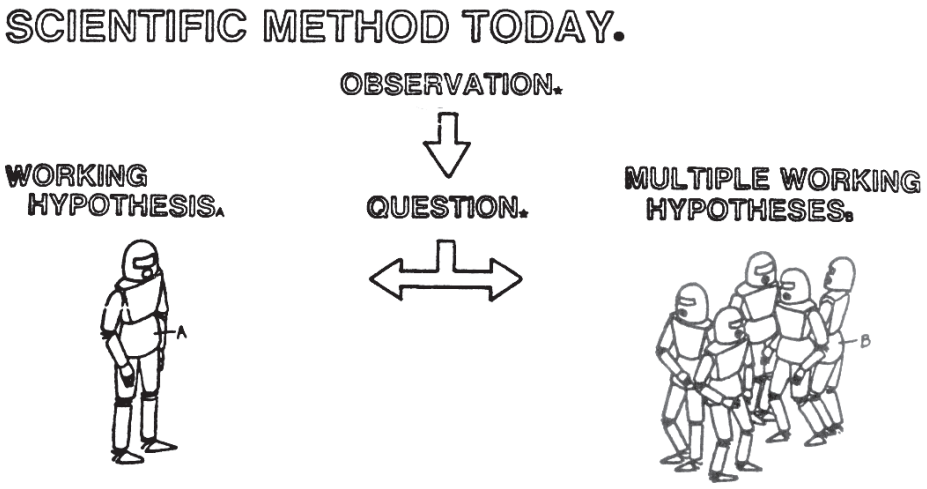
Teacher Key:
After all the observations are listed the group should conclude that it is an elephant.

Conclusions:
Students should begin to understand not only observation and inference, but the importance of collective data. That research done by many scientists lead to better explanations.

Time: 20-25 minutes

Background Material

Science today still begins with curiosity leading to observation. Almost immediately upon observing something new, a scientist—or any other curious person—will find one or more questions coming to mind.



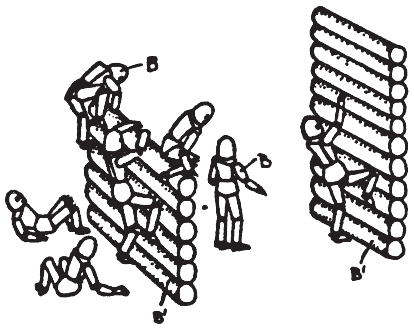
Note the Observation and Question. The robots represent hypotheses.

Once a question is raised, an answer is looked for From Galileo's time onward, scientists have made a habit of regarding every answer as tentative until it has been confirmed by experiment. Such a tentative answer is called a *working hypothesis* (plural: hypotheses), to emphasize that it is still unreliable and is being worked on.

As science progressed, it became clear that even the working hypothesis method had some pitfalls. First, anyone who has an idea that seems to be a good one has a tendency to develop a certain affection that "brainchild." This can lead to failing to recognize its shortcomings, even when one is trying very hard to be honest. The solution to that shortcoming is the method of *multiple working hypotheses.* In this method there is a deliberate attempt to develop a "family" of hypotheses, and a person is inclined to test and evaluate the hypotheses more honestly.

NONCHALLENGING TEST.

CHALLENGING MULTIPLE TESTS.



In these scenes, the hurdles the little hypotheses are jumping over represent tests by experiment. Although it doesn't always happen, it is awfully easy when you are fond of a hypothesis to set up a test that really doesn't challenge it very severely, as illustrated by the rather easy hurdle in the *nonchallenging test* scene. On the other hand, if there are may hypotheses, there is a definite tendency to want to reduce their number, so more tests are designed, and they are usually designed specifically to eliminate hypotheses rather that to support them. When one or more hypotheses survive deliberate attempts to eliminate them, we can begin to have some genuine confidence in them.

This poem was written by John Godfrey Saxe (1816-1887).

This first stanza is left until after students have discovered what type of animal it is:

Teacher reads this stanza first

It was six men of Indostan
To learning much inclined,
Who went to see the animal
(Though all of them were blind),

Stanza 1

The first approached the animal
And happening to fall
Against his broad and sturdy side,
At one began to bawl:
"God bless me! But the animal
Is very like a wall!"

Stanza 2

The second, Cried, "Ho! What have we here
So very round and smooth and sharp?
To me 'tis mighty clear
This wonder of an animal
Is very like a spear!"

Stanza 3

The third approached the animal,
And happening to take
A large tubular part within his hands,
Thus boldly up and spake:
"I see," quoth he, "the animal
is very like a snake."

Stanza 4
The fourth reached out an eager hand,
And felt about the knee,
“What most this wondrous beast is like
Is mighty plain,” quoth he:
“tis clear enough the aminal
Is very like a tree.”

Stanza 5
The fifth, who chanced to touch the ear,
Said. ”even the blindest man
Can tell what this resembles most:
Deny the fact who can,
This marvel of an animal
Is very like a fan!”

Stanza 6
The sixth no sooner had begun
About the beast to grope,
Then, seizing on the swinging tail
That fell within his scope,
“I see,” quoth he, “the animal
Is very like a rope.”

Teacher reads again
And so these men of Indostan
Disputed loud and long.
Each in his own opinion
Exceeding stiff and strong,
Though each was partly in the right,
And all were in the wrong!